# Mosquito News

Issued Quarterly by Eastern Association of Mosquito Control Workers

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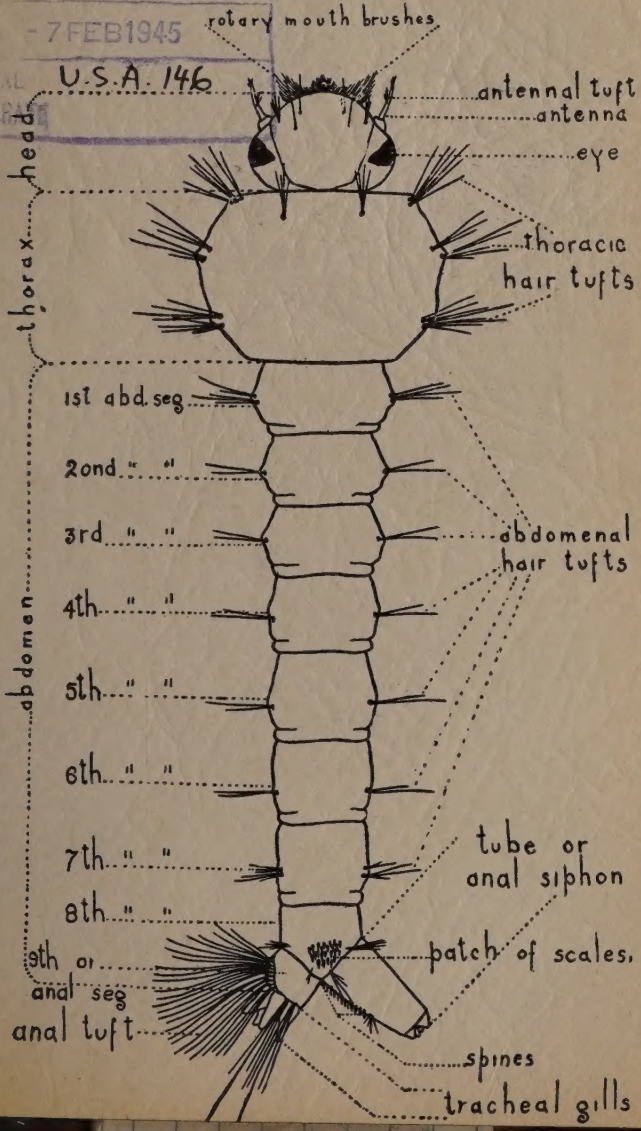

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## EDITORIAL COMMENT

History of mankind is filled with the effects of the mosquito on military campaigns. Battles and wars, as well as many peace-time ventures, have been frustrated by the diseases transmitted through the mosquito bite. This war seems complicated by the same old disease of malaria and to a much greater extent. The military operations of the past winter have been concentrated in tropical regions where malaria is the chief scourge of mankind. Victory in such infested regions must come to that side which can best protect its forces from the ravages of this and other insect-borne diseases.

Our readers are alert to this problem and the necessity for its solution. The situation demands that everyone in mosquito control work be ready to assist our country wherever we may be needed. Mosquito fighters will have to help win this war either at the front, at bases or at home. Those not in the armed forces must find new and better methods of eliminating Anopheline mosquitoes, of repelling her deadly bites or preventing the dread disease of malaria conveyed by her sting.

"Mosquito News" can and will play a big part in this fight by collecting and disseminating latest information to its readers. Your Publication Committee fervently hopes that this medium will assist some worker in answering the problem of preventing malaria among our fighting forces.

## Malaria On The Front Line

All newspaper accounts of the conflict now raging in the East lay great stress on the devastating part that malaria is playing in this war.

Frank Hewlett, of the United Press, states in his account of the battle of Bataan that, "ten-thousand of our troops lay in two field hospitals, most of them ill with malaria. Another ten-thousand were confined to camp with lighter cases of malaria." In another account, "malaria and malnutrition put more soldiers out of action than did the Japanese."

Similar accounts are coming from all the Eastern fronts and even though they may be greatly exaggerated, they point out that our casualty lists may show a far greater mortality from malaria than actual combat. A sick soldier is as much of a liability as a wounded soldier. It is a military axiom that it is far better to leave the enemy with five-thousand wounded than ten-thousand dead. The wounded must be defended, fed, clothed and transported; the dead will take care of themselves!

This truth places upon the shoulders of those of us engaged in mosquito control work a grave responsibility which we as loyal citizens must accept as a patriotic duty and a challenge to our ingenuity. The problem confronting us is as different from those encountered in the past as is this war itself with respect to other wars.

This is a motorized war of rapid movement covering wide areas and is being fought through jungles and swamps in many places hardly penetrated by white men before December 7th. In this war, troops seldom remain in one place more than a few hours and are generally

transported from point to point by motorized equipment. Even Field Hospitals must move as rapidly as the troops for in this kind of warfare it is a matter of advance or evacuate--there is no rest--and territory traversed today is forgotten tomorrow.

As a consequence of this type of warfare, the problem presented is not one of destroying the mosquito in its embryo stage nor concern with the species of mosquito to be found in the areas being fought over. Our problem is to develop, and provide the troops in the field with, the proper equipment for combatting the mosquito on the wing, whatever its species, and to encourage the daily administration of prophylactics, whether quinine or atebrin, to all troops in the field.

Undoubtedly, the copious use of repellents plus fogging down with power sprayers when possible, plus spraying the interiors of trucks, tanks, planes and tents, an insistence upon complete covering of the body with light clothing, plus headnets when they can be worn, may go far toward reducing the casualty lists. However, whatever the answer, we must find it now: There is no time for experiment or the gathering of statistics: We must make use of the means at hand and do it now. We must bear in mind that all of the territory we have lost must be fought over again before this war is won and when our boys go back over the road to victory, let us make sure they go fully prepared to fight their greatest enemy, malaria. This is <u>our</u> duty!

William Thom, Eng'r. Inspector
Middlesex Co. Mosq. Comm.
Metuchen, New Jersey.

## EASTERN ASSOCIATION OF MOSQUITO CONTROL WORKERS

A business meeting was held in Atlantic City during the Annual Meeting of the New Jersey Mosquito Extermination Association with 25 members and 4 guests attending. Minutes of this meeting have been distributed by the Secretary. Rubber and gasoline shortages in our area will restrict trips and discussion meetings to places easily reached by train. The first of these was scheduled for May in New York City as a discussion meeting. Papers presented at this meeting will be published in the next issue of "Mosquito News". The program for this meeting includes the following presentations:

1. Random Observations and Hypotheses concerning Relations of Fish and Mosquitoes,
   By Mr. John T. Nichols, Curator of Recent Fishes,
   American Museum of Natural History,
   New York City.

2. Observations on Some Relations of Mosquito Control Ditching to Marsh Birds,
   By Mr. Aretas A. Saunders,
   Fairfield, Connecticut

3. The Relationship of Mosquito Control to the War Effort,
   By Dr. H. H. Stage,
   Bureau of Entomology & Plant Quarantine, U. S. Department of Agriculture, Washington, D.C.

4. Plans for an Investigation to Determine the Meaning of Catches of Anopheles quadrimaculatus in Electric Light Traps,
   By Dr. Thomas J. Headlee, State Entomologist, N. J. Agricultural Experiment Station, New Brunswick, N. J.

## WORLD-WIDE MOSQUITO CONTROL

### Some Abstracts Of Interest To Mosquito Control Workers

By H. H. Stage,
Senior Entomologist,
Bureau of Entomology and
Plant Quarantine
Washington, D. C.

The review of contributions to information on mosquitoes presented by Dr. F. C. Bishopp and the author before the New Jersey Mosquito Extermination Association in March 1942 did not include all the sources available because of the limitations of space. The following references and brief abstracts not included in this review may be of interest to workers in the field of mosquito control and research who do not have ready access to extensive libraries on the subject.

Afridi, M. K., S. Abdul Majid, and Vidya Prasad. 1940. Observations on the range of dispersion of Culex fatigans and its infiltration into the Delhi urban area. Part 2. Journal of the Malaria Institute of India 3 (1):143-152. Calcutta. A significant increase in the numbers of C. fatigans Wied. was correlated with temperature but not with humidity in its invasion of the Delhi urban area. A rapid decline in numbers was associated with rises in the minimum and maximum temperatures above 72 and 100 degrees respectively.

Chang, T. L. 1940. The anopheline mosquitoes of Yunnan. Notes on their breeding habits and adult behaviour. Chinese Medical Journal 58 (2): 218-233. Peiping. Anopheles hyrcanus var. sinensis Wied. was the most common Anopheles of 17 species and varieties found in Yumman. Over one-fourth of the adults and

larvae were of this anopheline. In cowsheds, pigsties, and adjoining dwellings over half the anophelines were of this species. A. annularis V.d.W., A. minimus Theo., and A. maculatus Theo., in the order given, were next in abundance.

Del Ponte, Eduardo. 1940. Three species of Anopheles new to the Misiones Territory. Revista del Institute Bacteriologico del Departamento Nacional de Higiene 9 (4): 445-447. Buenos Aires. Anophelines not previously recorded in Misiones are: A. darlingi Root, a dangerous vector in various parts of South America, A. strodei Root, and A. lavei Galvas and De Amaral. Although species of the Nyssorhynchus group of the subgenus Nyssorhynchus have been considered unimportant in northern Argentina, this view may have to be revised as far as Misiones is concerned, reports the author.

Fonseca, Flavio da, and A. S. Ramos. 1940. Shannonesia nov. nom. Revista de Entomologia 11 (3): 966. Rio de Janeiro. Shannonesia is proposed for Shannoniella Fonseca and Ramos, a subgenus of Anopheles which is preoccupied by Shannoniella Townsend.

Gabaldon, A., P. Cova-Garcia, and A. Arevalo. 1940. Studies on anophelines. Series 1.3. Observations on the number of eggs, the salinity of the breeding places, and the length of the life cycle of three species of the oswaldoi subseries. Publicaciones de la Division de Malariologia. Publicacion No. 5. Caracas. A study made in Venezuela reports the number of eggs laid by Anopheles aquasalis Curry, A. oswaldoi Peryassu, and A. rangeli Gabaldon, Cova-Garcia, and Lopez, the salinity of their breeding places, and the length of time they require to develop from egg to adult.

Gabaldon, A., J. A. Lopez, and M. Ochoa-Palacios. 1940. Studies on Anophelines. Series 1.4. Strange variations in daily counts of anophelines in stable traps. Publicaciones de la Division de Malariologia. Publicacion No. 5. Caracas. It was found that more anophelines were caught on the first night on which a stable trap was operated than on the second and more on the second than on the third, after which the number remained fairly constant.

Gabaldon, A., M. Ochoa-Palacios, and M. A. Perez-Vivas. 1940. Studies on anophelines. Series 1.5. Observations on catches in stable traps with animal bait. Publicaciones de la Division de Malariologia. Publicacion No. 5. Caracas. Stable traps with animal bait have been employed since 1927 in Venezuela, where they are useful in the districts in which Anopheles albimanus Wied. is the chief vector of malaria but not in those in which the vector is A. darlingi Root, as the latter species is not zoophilous and therefore is seldom taken in a trap.

Hu, Stephen M. K. 1940. The house-frequenting behaviour of Anopheles hyrcanus var. sinensis Wiedemann in the Shanghai Area, Part 3.--Indoor resting places. Lingnan Science Journal 19 (3):403-410. Canton. The greatest numbers of this anopheline were found in bedrooms and the fewest kitchens.

Ivanova, L. W. 1940. The influence of temperature on the behaviour of the Anopheles maculipennis larvae. Medical Parasitology and Parasitic Diseases 9 (1-2): 68-70. Moscow. A detailed account of laboratory observations in Moscow on the effect of temperature is presented on the movement of fourth-instar larvae of Anopheles maculipennis var. messeae Flni. and A. m. var atroparvus Van Thiel.

Lever, R. J. A. W. 1940. Entomological notes. 2. A mosquito hitherto not recorded in Fiji Dept. Agr., Agricultural Journal 11 (3): 82. The discovery of Aedes vigilax skuse in Fiji on the south coast of Viti Levu in March 1940 is reported for the first time.

Marks, Elizabeth N. 1940. Habits and chaetotaxy of the larva of Anopheles atratipes Skuse. Royal Society of Queensland Proceedings for 1939, 51 (1): 19-23, illus. Brisbane. Larvae of A. atratipes were collected from Midgee, Redcliffe, and Bribie Island, Queensland, in fresh water and were always associated with A. annulipes Wolk. and Culex annulirostris Skuse.

Staley, John. 1940. A species of mosquito (Diptera, Culicidae) new to Britain. Nature 146 (3698): 368. Third-and fourth-instar larvae of Theobaldia longiareolata Macq., which had not been previously recorded in Great Britain, were collected at Portsmouth from a small pool of slightly foul, saline water.

Vargas, Luis. 1940. The maxillary index in some American Anopheles. Revista del Institute de Salubridad y Enfermedades Tropicales 1 (3): 275-289. The maxillary indices of females are given as follows: 14 for Anopheles maculipennis var aztecus Hffm., 11 for A. pseudopunctipennis Theo., 17 for A. albimanus Wied., 14 for A. quadrimaculatus Say in Mexico, and 13 for A. hectoris Giaquinto from Guatemala. A. m. var. aztecus and A. quadrimaculatus are classed as zoophilous and the others as anthropophilous. Data on food preferences of A. quadrimaculatus, A. albimanus, and A. pseudopunctipennis are quoted from the literature confirming the validity of the classification based on maxillary indices.

Adamson, A. M. 1941. The geographical distribution of insect pests. Tropical Agriculture 18 (3): 42-47. Trinidad. Various problems relating to the spread, chiefly by human agency, of insects from one country to another are discussed. Increased speed in transportation, especially by aircraft, is believed to have been responsible for the introduction of Anopheles gambiae Giles into Brazil. Instances cited of the eradication of insects from invaded territory include the eradication of anopheline mosquitoes from Barbados.

Baxter, G. R. 1941. Preventive measures against mosquitoes. Part 2. Fiji Journal of Agriculture 12 (2): 41-45. A great variety of domestic breeding places in Suva, Fiji, are given and suggestions for controlling mosquitoes in nondomestic breeding places are discussed.

Chopra, R. N., D. N. Roy, and S. M. Ghosh, 1941. The insecticidal and larvicidal action of the essential oils of Ocimum basilicum (Linn.) and Ocimum sanctum (Linn.). Journal of the Malaria Institute of India 4 (1): 109-112. The results given indicate that both these plants possess some insecticidal action, especially in the case of mosquitoes, although it cannot be compared with that of pyrethrum. The high cost of processing the oil prohibits its practical use.

Clark, R. H. P., and M. A. Choudhury. 1941. Observations on Anopheles leucosphyrus in the Digboi area, upper Assam. Journal of the Malaria Institute of India 4 (1): 103-107. The habits and breeding places of this anopheline are briefly discussed. It is concluded that this species is a vector of importance in Digboi and its vicinity.

Covell, Lieut.-Colonel G. 1941. Anti-malaria operations in Delhi. Part 3. Journal of the Malaria Institute of India 4 (1): 1-14. Details are given of the permanent engineering works carried out in the Delhi urban area since 1936. The program has been completed with the exception of one major project. The general principle adopted was to prevent flooding from any source over the whole inhabited area and for at least half a mile beyond its limits. The area so protected is levelled and dressed down in such a way as to drain away local rainwater completely, or, where this cannot be effected, to direct it into one or more tanks especially excavated for the purpose.

Sen, P. 1941. Aquatic plants in the ecology of anopheline mosquitoes. Journal of the Malaria Institute of India 4 (1): 113-138. The relation of the breeding and emergence of 12 species of anophelines to the presence of various aquatic plants has been investigated in certain villages in lower Bengal, where malaria is endemic.

Senior White, R. 1941. Observations on the adult habits of Anopheles fluviatilis and Anopheles varuna. Journal of the Malaria Institute of India 4 (1): 57-62. Data are given for two areas, the Satpura Ranges in the Central Provinces and the neighborhood of Vizagapatan in Madras.

Shannon, R. C., and J. Hadjinicalao. 1941. Egg production of Greek anophelines in nature. Journal of Economic Entomology 34 (2): The number of eggs produced per anopheline female is primarily dependent upon the size of the adult and of the egg. It is closely given by the formula $N = (0.834\ W/S - 0.401)^3$ where N is the mean number of eggs, W the mean wing length, and S the mean egg length. These constants apply to A. superpictus Grassi, A. sacharovi

Favr., A. subalpinus Hackett and Lewis, and A. typicus Meig. It is believed that further studies will demonstrate a class connection between differences in egg capacity and differences in the biology of the species.

Thomson, R. C. Muirhead. 1941. Studies on the behaviour of Anopheles minimus. Part 4. The composition of the water and the influence of organic pollution and silt. Journal of the Malaria Institute of India 4 (1): 63-102. The work was carried out in Tocklai in upper Assam and deals with the relation of A. minimus Theo. at all stages to its environment. The composition of the water in the breeding places of this anopheline was compared with that of water collected in places where this species seldom breeds. Gravid females failed to distinguish between water from the normal breeding place and water in which they do not usually breed, despite the difference in composition. In rivers, the natural controlling effects usually attributed to silt are more likely to be due to the simultaneous increase in current velocity.

Viswanathan, D. K. 1941. Experimental malaria control in a hyperendemic tea garden in upper Assam by the use of pyrocide 20 as an insecticidal spray. Journal of the Malaria Institute of India 4 (1): 35-56. Weekly spraying with a mixture of pyrocide 20 and kerosene brought about a definite reduction in the incidence of malaria in a hyperendemic tea garden. The malaria incidence in the period April to December was only 250 per mille in 1940 when spraying was in operation, as compared with 570 in 1939, and as against an estimated incidence of 480 per mille in 1940.

## California

By Harold F. Gray, Eng'r.
Alameda Co. Mosquito
Abatement District
Oakland, California

Mosquito prevalence in general in California in 1941 was probably about normal, but due to late rains in April and May was well above normal in the coastal areas in particular. In the Sacramento-San Joaquin Valley the production of Anophelines appeared to be below normal.

Observations made by T. F. Kelley in the course of a survey of mosquito breeding in cemeteries in Alameda County indicate a heretofore unsuspected presence of non-anthropophilus variety of Culex pipiens. Kelley's study showed that mosquito breeding in flower containers on graves in cemeteries results in a very appreciable output of mosquitoes, principally Culex and Theobaldia spp., although approximately 10% of the total number (in October) were Anophelines.

W. C. Reeves reported (December 15, 1941, Conference of California Mosquito Control Association) the successful transmission of St. Louis encephalitis by Culex pipiens.

A new mosquito abatement district was organized at Fresno, and a considerable annexation of territory to the Merced district and the Contra Costa Districts was effected. Proceedings for annexation of a large area to the East Side district at Modesto were also under way.

## Mosquitoes In Bomb Craters

By P. G. Shute, Entomologist
Ministry of Health's Malaria
Laboratory, Horton Hospital,
Epsom, England.

"You see the bomb craters of last winter and early spring would hardly be likely to contribute to mosquito breeding the following summer. For one thing the food content of the water would be practically nil, except, for perhaps the species Culex pipiens. But now the craters have held water for about a year and, presumably, many of them will be rich in the food essential to larvae. I have a large number of craters under observation but at the moment the effect of the very cold weather of the previous months has prevented eggs hatching and those species which hibernate as fertilized adults have not yet ventured from their resting places.

"What I am expecting to find is that, providing a species is indigenous in an area, their numbers will increase according to the additionally breeding grounds available. For example, in thickly wooded country in the south of England, the species Aedes (Ochlerotatus) cantans is very common and I have never found larvae in ponds in open country. Therefore, where bomb craters have been made in woods, extra breeding space is available and last summer this species will probably have made good use of them, but as the eggs of the previous summer do not hatch until the following spring, we shall not know the results until about the end of March or early in April. Conversely, where bomb craters have appeared in open country, on heaths and commons, we may expect an increase of such species as annulipes and other species of similar habits. But I will certainly write to you again and give you any information I am able to collect.

"You see, during last winter's fairly heavy raids, Jerry used to come over with the intention of hitting something worth while but from what I saw of it, once he was pursued, or if old iron got too close to his tail to be comfortable, he used to drop his bombs and turn about. I saw this happen on many occasions, especially around London. Sometimes when the A. A. barrage on the outskirts of London was particularly severe, they would attempt to find an opening, fail, retreat, try again, fail and then give it up, drop their stuff and make off. We were so convinced of this that often we would take cover when we heard planes hovering overhead for any length of time and ignore those which were passing overhead. It was on such occasions that the countryside became riddled with craters."

(Contributed by Harold F. Gray, Eng'r.
Alameda Co. Mosquito Abatement Dist.
Oakland, California)

## ACTIVITIES IN MEMBER STATES

### "This Season's Program"

Suffolk Co. Mosq. Exterm. Comm.
Yaphank, L. I., N. Y.

On April 15th, another season started for the Suffolk County Mosquito Extermination Commission. This year is the most important summer which the Commission has had to face on account of the conditions brought on by the world war. The local war which the Commission is waging against the Mosquito is only one cog in the great war machine. It is however, an important cog because of the concentration of camps and industries in Suffolk County.

There are two angles to the mosquito problem. One is the control of those insects which carry diseases - the most important in this community being "malaria". Although this disease is not prevalent at the present time the mosquitoes which carry it are present in considerable numbers. Malaria is conveyed by the mosquito from one victim to another and the movement of large numbers of workers and soldiers into the county from other sections, particularly the south, complicates the situation. The most prolific area for the breeding of malaria carrying mosquitoes is around Camp Upton and the Commission has employed large numbers of W.P.A. workers in this section all winter and will continue to do so all summer. The Commission believes that when the work in and around the camp is completed this section will be comparatively free from this type of mosquito as well as the other varieties significant for their annoyance.

The second angle is control of comfort disturbing mosquitoes. There are many different kinds and they breed in a great many different places from cesspools to sheltered accumulations of water in the woods. A large percentage of these mosquitoes can be dealt with directly by the Commission by means of its fighting equipment. But there is one brand known as the household mosquito, the control of which required the cooperation of every householder in the county. Residents are particularly urged to seal up cesspools so tightly that there is no opening of any kind into the pool. Another practice which produces considerable breeding and must be discontinued is the habit of throwing tin cans outside. If owners and tenants will observe these two suggestions, then, with the operations being carried out by the Commission, annoyance by household mosquitoes can be cut down to a minimum.

The mechanical equipment of the Commission consists of sixteen trucks and three boats and much miscellaneous small equipment. All this equipment goes into operation with full steam on the starting date. Eight of the sixteen trucks afe known as Patrol Units. They carry the men, tools and supplies of larvicide from job to job. Each crew is in charge of a competend foreman. All of our foremen have been with us for years and are courteous, thoroughly trained and experienced. Each foreman has a definite section to patrol and is accountable for conditions in his particular district. By this means the salt marsh of the entire county is adequately covered. The workers do not have an easy time. Their work consists mostly of tramping over meadows, carrying heavy spray Knapsacks on their backs and in order to reach each and every corner where breeding exists it is usually necessary to plod through mud, water and briars.

Four more trucks are tankers and carry larvicide to from 700 to 750 fresh water locations which require treatment. The number varies with the rainfall. Each tanker carries two men, 500 gallons of liquid and 500 feet of hose. In addition to the hose the nozzle will spray another 100 feet so that the equipment will cover considerable ground. Many of these locations are in places devastated by the hurricane and are still full of holes and fallen trees making treating operations difficult.

Two trucks are used to treat the 11,000 catch basins in the county. These catch basins furnish about 25% of the household mosquito population so that they are very important. Shelter Island has a unit all by itself. This unit treats both the salt marsh and the fresh water areas and the crew is responsible for conditions on the entire island. The 16th truck is a utility truck and is used for servicing the other units.

As for the boats, one operates out of Babylon and covers that area known as Fire Island Beach which contains acres and acres of meadowland. The captain who operates this boat is also the foreman and these crews carry out the same functions on the beach as the saltmarsh crews on the mainland. Another boat operates out of Brookhaven and covers in a similar manner that section known as Great South Beach. The third boat is a fast inspection cruiser and is used for the purpose of checking the progress of the work on the beaches and the islands in the Bay. The importance of beach control arises from the fact that the salt marsh mosquitoes can fly up to forty miles from their breeding place.

The foreman and drivers all report to two general foremen, and for the East end and one for the West end of the county. These General Foremen are responsible solely to the Director on whose shoulders rests the entire responsibility for the success of the season's work. Operation of the traps, analysis of the catch and other inspection work is in charge of the Chief Inspector. The Commission also maintains a competent Engineering crew in charge of a licensed Engineer. They are continually employed laying out ditches, giving grades and charting operations.

The Commission is well prepared and doing everything possible to bring about a successful 1942 season. The salt marsh ditches which were dug eight years ago are somewhat overgrown and outlets stopped up. The Commission has neither men, money nor machines to redig the ditches but feels that diligent treating operations will greatly reduce this handicap.

## Productile Abatement

By O. W. Lafferty, Exec.-Sec'y.
Cape May Co. Mosq. Exterm. Comm.
Cape May Court House, N. J.

The writer is wondering if mosquito abatement workers have, or are experiencing, similar difficulties as mentioned below:

In Cape May County, New Jersey, both the Army and Navy contonments are being enlarged as rapidly as possible; most of the locations where they are situated need elevating to eliminate standing water, many acres of swamp or boggy land have to be groomed to suit the needs. New roads leading to these units are built up to a height of ten feet in places. A Federal, State and County flying field is also in the making and will cover many hundreds of acres; hydraulic fill on these government projects is tabooed, as mud, sand or debris do not meet with the requirements.

That these projects may be perfected with the proper approval, it requires thousands of tons of earth (loam, clay, gravel) to meet the engineers' O.K. To get this material, which is transported by trucks, the contractor purchases adjacent farm land or buys by the yard; if by the yard, we are safe, but should he buy by the acre he takes the earth as long and deep as he can excavate it. Gravel for roads, runways, etc. is obtained likewise. This is leaving many acres with standing water which will be undrainable and always available for breeding; also, a menace and an eyesore.

To complain about this avails us nothing. There apparently is no way to remedy this method; the contractor, nor any agency, seems not to care what mos-

quito breeding menaces they leave, though the government and health groups are howling for mosquito protection.

I have always been interested in reports and discussions by mosquito fighters on breeding they find in gravel or clay pits. Most reports favor no breeding in old pits, a few say occasionally they discover light breeding. In this county we will take larvae from three out of five pits within five years after digging; some produce breeding the first year, but this is rare. The pit menace might not be serious for the duration of this county's defense program, but I feel we should not hand too many "lemons" like this to those who follow extermination work in the years to come.

Pardon my reference to the following sonnet, but it is just the way I feel:

"It is not the work of one man
That brings us to the goal;
It's the everlasting teamwork
Of every blooming soul"

## Rhode Island

Milton H. Price reports that the Legislature closed without taking any action on mosquito control thus leaving them with no mosquito control program for 1942.

## Atlantic County, N. J.

By Fred A. Reiley, Supt.
Atlantic City, N. J.

Mosquito breeding control came into its own - at

least for 1942 in this County. After ten lean years with appropriations ranging from $20,000.00 to as low as $3,500.00, we suddenly find ourselves with $33,327.00. Plans and budgets were, of course, made for this amount of money and submitted to the Director of the N. J. Agricultural Experiment Station for his approval in November of 1941.

Under our mosquito laws our maximum appropriation possible for the year 1942 was $33,408.52. The year we received $20,000.00 our maximum under the Law was $85,953.00. With continued reductions in assessments, appropriations will be too small for adequate mosquito control work in counties like Atlantic. Our Freeholders feel that the money spent on mosquito control is much too great. $14,000.00 is their idea of an ample appropriation.

We have close to fifteen million unit feet of ditches in our salt marshes which must be kept in good condition. This ditch maintenance was anticipated years ago and cleaning machines were developed for the purpose. We still have three of these machines; one built in 1927, one in 1929 and one in 1931. The first one is about worn beyond repair. Now that we have some money, we are trying to place two of the cleaners into operation. Priorities force us to use materials on hand, and it is not easy to do. We have succeeded in getting one machine ready for work, and will soon have the second one assembled from parts of the two old ones.

We are planning to recondition one and one-half million feet of salt marsh mosquito control ditches. This work is to be done in the marshes nearest to Atlantic City. Main ditches will be cleaned with machines, and a hand tool crew will clean the ditches next to the bottoms and spur ditches. This crew will also check and repair dam boards in outlets of the

numerous duck ponds.

As to fresh water work, most of it will be efforts to control the breeding of the house mosquitoes on Absecon Island and, where possible, places on the Shore Road. We cannot carry on this work in the entire County. Other upland fresh water breeding will be confined to the control of A. quadrimaculatus in the northern end of the County.

Two new trucks or second-hand trucks equipped with power sprayers will be used for control of breeding in low lots of Margate, Ventnor Heights, West Atlantic City and Brigantine; also for spraying breeding waters under buildings in Atlantic City.

Every effort will be made to protect our summer visitors. Our public expects this. But with so much territory to be cared for - territory that has not been covered for from five to ten years - there will be times when the County will have more mosquitoes than it will feel it should have. The fact that it will require several years of work to regain the lost years will be hard to explain to the general public.

The most we can do is work to the full limit of our resources and perhaps offer a little prayer for a dry season, and not too many mechanized mishaps.

Monmouth County, N. J.

By Harry G. VanNote, Supt.
Red Bank, N. J.

The five military camps situated along the shore area in Monmouth County will be in a possible vulner-

able position for attacks from the salt marsh and upland species of mosquito pest in the event of abnormal rainfalls descending during the mosquito season from May to September 15th.

The Monmouth County Mosquito Extermination Commission is making preparations to prevent as much as possible such attacks with its limited funds by reconditioning the ditches on the salt marsh and upland with its labor force, augmented by the labor group of the Works Progress Administration, whose work is confined exclusively to recutting old ditches and installing some new ditches in accordance with the plan of the National Defense Project, for mosquito control, which started on the second day of last September, 1941.

In addition to the labor groups, the inspection force of the Mosquito Commission will be urged to put forth their best efforts to search out and destroy all existing mosquito larvae within their territory. It will be impressed upon them that they have a patriotic duty to perform in the National Defense Program.

The Commission will be handicapped this season in carrying out its program for mosquito pest control because of the high prices of necessary equipment to be purchased. Indications at the present time also reveal that the scarcity of mosquito oil has caused a priority to be placed on that commodity, which necessitates the substitution of pyrethrum larvicide to be used this season.

No effort will be spared in informing the residents of Monmouth County, through the Press, of the important and patriotic duty they have to perform by

cooperating with the Mosquito Commission in reducing mosquito breeding for the duration of the mosquito breeding season by turning-over or eliminating all water-holding containers on their property. It will also be impressed upon them that the Military Personnel residing in the encampments along the shore area cannot prepare to fight the human enemy in foreign countries unless the mosquito is fought at home.

## Plans For 1942 Season In Norfolk, Va.

By Perry W. Ruth, Supt.
Norfolk City Bureau
Mosquito Control

Our plans for 1942 had been well developed during the preceding winter. Personnel had been lined up and equipment was ready, including a new Spencer stereoscopic microscope - thanks to the invaluable assistance of Thomas D. Mulhern with the specifications - which arrived just in time to beat the "priorities".

Then the Japs threw our larging war machine into high gear and when we caught our breath after the first take-off it was hard to get our bearings from unfamiliar land marks. We found swamp land and wooded knolls of yesterday now supporting air plane runways, barracks and hospitals and surface drainage problems which we had nursed and doctored for years were now being disregarded by Army and Navy engineers who had more pressing matters to attend to.

Undoubtedly the Hampton Roads defense area is one of the most vitally important on the Atlantic Coast and rather resembles a great wheel with Norfolk

near the hub. The population of this area has been practically doubled with new-comers from every other state in the Union as well as many foreign dependencies and it may be months before temporary living conditions can offer the usual protection against the various insect plagues, including mosquitoes.

Thus our work for this year has already been cut out for us and has not been simplified by the fact that Government construction has completely nullified the satisfactory drainage we had established in two salt marsh areas when it closed their broad natural outlets with hydraulic fill and so formed artificial fresh water marshes where Anopheles have already been found in alarming numbers. I read a short paper on this subject at the Convention in Atlantic City in March.

Since our available funds were determined by a municipal budget approved before the emergency period, the outlook was dark until the U. S. Public Health Service stepped into the National Defense picture. Salvation seemed at hand until it was discovered they could only operate in areas which were potential breeding places of malaria vectors. Any one who believes Anopheles to be the only mosquito enemy of National Defense has never experienced the utterly demoralizing effect on out-door workers of an attack by hungry Aedes sollicitans or A. taeniorhynchus or seen the off-duty drain of these workers' efficiency which can be caused by the unrestricted propagation of the many night biting species indigenous to this locality. Such an attitude is doubly unfortunate here where Aedes aegypti breed prolifically and are an increasing menace due to the sea and air borne guests whom we are receiving unexpectedly in ever greater numbers.

However, I feel that we can say, along with the United States Marines, that "the situation is well in hand". Our offer of assistance in training personnel for local mosquito control work has been made to and accepted by the local U. S. Naval Health units and the cooperative spirit now existing between the U. S. Navy, the U. S. Public Health Service and our own City organization clearly indicates that "united we stand".

Another twelve months may bring us additional problems which we cannot foresee today but I confidently predict that our local research and study in cooperation with the efficient organization of other workers who have the same interest will effectively meet any situation which National Defense may ask us to face.

## DEVELOPMENTS IN MOSQUITO CONTROL

### Anopheles And The Light Trap

By Dr. Thomas J. Headlee,
Entomologist, N. J. Agri.
Experiment Station,
New Brunswick, N. J.

The electric light trap appears to be the only means by which a reasonably adequate notion of mosquitoes on the wing can be reported day after day throughout the entire active mosquito season. This instrument has been shown to catch representative samples of Culex, Aedes and certain Anopheles, as well as many of the less abundant and more sporadic species. Back of this statement lies a trapping experience covering the bulk of the mosquito season from 1933 to 1940 inclusive, in the course of which 1,211,639 female mosquitoes were taken and identified.

With such performance as these traps have given for the ordinary species of mosquito it is most surprising to find that they do not catch what is believed to be a representative sample of Anopheles quadrimaculatus, particularly in the southeastern states. That they do catch Anopheles quadrimaculatus there can be no question for of the 1,211,639 female mosquitoes 8,369 were Anopheles quadrimaculatus.

It seems to the writer that if the meaning of these figures in terms, first, of Anopheles quadrimaculatus on the wing, and second, of malaria incidence in regions where it is a malaria vector, can be worked out, a long step forward in the control of this disease-bearing species would be taken. The methods commonly employed for determining the density of the quadrimaculatus must be very time-consuming and not as accurate as could be desired.

Some steps looking toward the meaning of the figures derived from stable, outbuilding, and human dwelling collections have been taken and the most promising development with which the writer is familiar is the invention and use of the nail keg mosquito trap. It is quite possible that the electric light trap catches of quadrimaculatus represent the abundance of this species on the wing and that the catches in the nail keg traps, stables, outbuildings and human dwellings represent special concentrations. From the ways in which the nail keg trap has been handled, it seems probable that it is less of a concentrating agency than the others mentioned.

In view of the ease and accuracy with which the electric light trap can be operated and the rather complete representation of the various species of mosquitoes, both pest and disease-carrying, which can

be caught by its use, a determined effort should be made to correlate the catching ability of this type of trap with the nail keg, stable, outbuilding and human dwelling collections. Then the abundance of mosquitoes on the wing thus determined should be correlated with the incidence of the disease of malaria in regions where Anopheles quadrimaculatus is distinctly the vector of this disease.

This, it seems, is the first job. Then in due course will come the treatment of the other species of disease-carrying Anopheles.

## S/V Culicide Oil

By R. H. Sammis, Supt.
Nassau Co. Mosq. Exterm. Comm.
Rockville Centre, L.I., N.Y.

During the past year, the Socony-Vacuum Oil Company has been working in close cooperation with Mr. R. H. Sammis of the Nassau County Mosquito Extermination Commission in the development of a new type of larvae killing oil which is now available under the name S/V Culicide Oil. This material is prpduced synthetically from natural petroleum and has the following physical characteristics:

| | |
|---|---|
| Gravity, °API | 5.0-6.0 |
| Sp. Gr. | 1.366-1.0291 |
| Flash, C.O.C. | 300°F. Min. |
| Pour | 0°F. Max. |
| S.U. Fisc. @ 100°F. | 230" Max. |

It will be seen that this product has an extremely high specific gravity for an oil having a 230" viscosity. This is due to its highly aromatic or cyclic

composition. No toxic materials are added to this oil such as phenols or cresylic acids. It marks the first time, to our knowledge, that a fluid mineral oil, heavier than water, has been proposed for the control of water-dwelling insect larvae.

When S/V Culicide Oil is introduced into a tank of water containing either Aedini or Culicini larvae, the oil settles to the bottom in small droplets. A small amount of pressure will force the oil thru the water surface, and no appreciable oil film will be left to interfere with the respiration of the larvae. After some time the larvae, in searching around the bottom for food, encounter the S/V Culicide Oil and swallow small amounts. Death inevitably follows, though it may be a matter of some hours. Microscopic examination of many of the dead larvae has shown that in every case, oil is present in the digestive system. Pupae are, of course, in no way affected as they do not eat during their existence. However, it follows that if the larvae can be destroyed, there will be no pupae. These experiments were checked by an independent laboratory, as well as in both the Socony-Vacuum Oil Company and Nassau County Laboratories.

As soon as weather permitted in the spring of 1941, field tests were started in the salt marshes on the southern shore of Long Island in the vicinity of Jones Beach. Inspectors and other personnel of the Nassau County Mosquito Extermination Commission worked with representatives of the General Laboratories and the New York City Division. Several ponds were selected for test along with two drainage ditches. The amount of oil used in the treatment was roughly the same as the Commission normally used of the regular fuel type spray. In all cases, an untreated pond, less than 100 feet from the treated one, was left for con-

trol purposes. On the day of treatment in May, none of the ponds contained many larvae. An inspection was made after six weeks, at which time all ponds which had been sprayed with S/V Culicide Oil were entirely free from breeding, while controls were heavily populated. The same was true of the drainage ditches selected for test.

Another six weeks were allowed to pass before the second inspection. At this time, July, the ponds treated early in May, though they had varied in size with weather conditions, were still 100% protected. The control ponds had become so completely infested during this period that the inspectors were forced to spray them with regular oil. Just eight days prior to our inspection a large pond had been treated with regular fuel oil and on the day of inspection needed another treatment. It was our experience throughout the summer's work that a surface oil was effective for not more than 10 days. Dry weather conditions made it impossible for us to carry out our original experiments beyond a twelve week period. We can definitely say then that a pond treated with S/V Culicide Oil will be protected from mosquito breeding for at least three months and that no pond thus treated failed to give complete protection.

Drainage ditches were protected as long as flood waters were not of sufficient violence to wash out the bottom.

The effect of S/V Culicide Oil on plants and green foliage is much the same as that of any other oil. That is to say that the plants will burn brown and die. In treating most marsh land this will not be too great a factor. If any fish are in the water, they are likely to be poisoned in their efforts to obtain food off the bottom. In the majority

of cases, however, it will not be necessary to spray oil when fish are present because the fish themselves are a very good mosquito control agency. Top feeding fish which are cultivated for mosquito control would probably be harmed less by S/V Culicide Oil than by the conventional surface oil. Ornamental garden pools containing gold-fish do not need any larvicide to keep down the breeding of mosquitoes.

The use of S/V Culicide can be recommended for use in either salt or fresh water ponds for the control of either aedini or culicini type larvae. No special type of equipment is needed to apply this material in spite of its viscosity of 230 seconds. When using regular fuel oil spray equipment, it will be noted that the oil emerges from the nozzle in one single fine stream instead of a fog or spray. This is the ideal condition as the stream will then have sufficient force to break through the water's surface and sink to the bottom. Very fine drops such as would be formed in a fine mist, would be held up by the surface film of the water. It is not at all necessary to have microscopic drops of oil because the larvae will feed from drops many times their size.

This oil, like all oils, tends to soften rubber hose. As its boiling range is too high to permit spontaneous evaporation, it is best to wash it out of hose if it is to remain idle for some time. S/V Culicide Oil is never diluted with other oil before spraying however, as the gravity balance would be upset and its value lost.

It is true that the cost of a single application of S/V Culicide Oil is higher than for conventional fuel oils because of its higher cost per gallon and because of increased labor charges resultant from slower rates of coverage. It is also a fact that the

results of the above tests show that the use of S/V Culicide over a season would result in important economies because only one application may be required as compared to repeated sprays with fuel oils. Frequent inspections would not be necessary. Furthermore, the adoption of S/V Culicide Oil may enable protection of stump holes, catch basins and out-of-the-way places which heretofore could not be treated without incurring excessively high labor costs.

The credit for the development of this larvicide goes to Dr. James W. Ramsey, Captain D. E. Longworth and Milton Wise.

## Anti-Mosquito Legislation And Mosquito Control Commissions Evolve In The Direction Of More Comprehensive Pest Control By Community Action

By R. D. Glasgow, Ph.D.,
State Entomologist,
New York State Museum,
Albany, N. Y.

Less than half a centure ago, forty-five years to be exact, men first knew that mosquitoes carry malaria (Ross, 1897). Three years later (Reed and his associates, October 27,1900) was announced the fact that yellow fever is mosquito borne.

Under pressure of this knowledge came the first exploratory legislation, and the first organized efforts, first to suppress mosquito carriers of these diseases, and later to suppress the so-called pest mosquitoes as well.

Because of the flight range of adult mosquitoes, suppression of these insects was early recognized to be a regional problem which could not be met effectually through any uncoordinated action by individual property owners, even under compulsion; but which demanded organized community action with some inevitable clash of private and public rights and privileges.

Legislation to effect such community action has undergone a very significant progressive evolution in its step by step adjustment to new problems, new procedures, new concepts of public service, and newly developed consciousness of the growing complexity of interactions among special interests which have come more and more urgently to be involved in one way or another.

Advancing experience with community action for suppression of mosquitoes and with related legislation has led to greater public consciousness of the fact that many other insect pests likewise can be effectually suppressed only by similar community action.

In consequence, as legislation originally directed solely toward the suppression of mosquitoes has been amended from time to time, or has been copied from State to State, it has tended to assume more comprehensive forms.

In California and Utah, for example, such legislation has come to read "----mosquitoes, and/or----", naming also various other insect pests, the suppression of which can be best accomplished by community action.

It begins to appear, therefore, that sooner or later, such new responsibilities will be placed upon

existing mosquito control commissions, or that new commissions must be provided to deal in a similar but appropriate manner with such added public requirements.

It seems probable that, since all such new pest control activities must, like present mosquito control work, be organized in response to local initiative, administered by local agencies, and financed with local funds, considerations of simplicity and economy in the organization and operation of this new work might be best served by the assignment of these new responsibilities to existing agencies where such exist.

Among the many pest control problems that might be best met by community action, the control of blackflies, for example, would be an especially appropriate addition to the responsibilities of a mosquito control commission.

Accomplished by use of a pyrethrum larvicide, and thus with materials and equipment normal to the suppression of mosquitoes, the economies resulting from such an extension of responsibilities could doubtless be multiplied many times as other insect pests might be added to a community pest-control program.

## New Jersey Mosquito Larvicide For Control of Blackflies (Simuliidae).

By R. D. Glasgow, Ph. D.,
State Entomologist,
New York State Museum
Albany, N. Y.

The blood sucking blackflies (Simuliidae) may be a nuisance anywhere, especially in mountainous or hilly regions where the streams are rapid; but in many parts of the world these insect pests constitute a major economic problem.

In the lower Mississippi Valley, more especially before installation of modern flood control, blackflies have caused huge losses of livestock, and much physical suffering and inconvenience to the human population of affected regions. Staggering losses have been reported of which the following are cited as examples (Webster, F. M., U. S. Bur. Ent. Bull. No. 14, 1887, pp. 29-39): 1. In 1866, within a few days of their appearance, huge swarms of blackflies are reported to have killed more than 4,000 mules and horses in the three Louisiana parishes of Tensas, Madison, and Concordia; many plantations having lost every mule owned: 2. In 1874, a single county of southwestern Tennessee reported more than $500,000.00 worth of livestock killed by blackflies: and 3. In 1884, blackflies are said to have killed more than 3,200 head of livestock in Franklin Parish, Louisiana, within a week.

In Eastern Europe, losses of livestock killed by blackflies have likewise been tragic (Riley, C. V., U. S. D. A. Ann. Rep. for 1884, pp. 340-345): 1. In 1783 Schoenbauer reports the loss on a tract of land belonging to the Imperial Austrian Mining Institution in Hungary, of 20 horses, 32 foals, 60 cows and oxen, 71 calves, 130 hogs, and 310 sheep killed by blackflies. In 1880, the American Legation at Vienna reported the loss that spring in the single county of Hungad, of 158 buffaloes, 186 oxen, 175 cows, 56 calves, 49 sheep, 118 horses, and 1137 hogs all killed by blackflies.

During the first world war blackfly outbreaks in Eastern Europe resulted in disastrous losses of livestock, both of food and work animals, with the result that after the Armistice the German Government provided for a very comprehensive study of the blackfly problem, which was continued until the present war began. (Wilhelmi, Prof. Dr. J., Die Kriebelmuckenplage, Gustav Fischer, Jena, 1920, 245 pp.).

In the mountain resort areas of northern New York and New England, there is one particularly troublesome brood of blackflies which emerges in late June, and may persist until after the Fourth of July.

As a result, the season for summer hotels and resort camps in these areas does not really open until near the middle of July; and since the season closes on Labor Day because schools start immediately after, the loss of two or three weeks' business at the beginning of the season, due to blackflies, is a major economic handicap to the region.

At present, the "overhead" expense for the entire twelve months must be carried from the profits of a six weeks' season. Any possible extension of this season by control of blackflies from the middle of July toward the time when schools close in June would, as one summer resort operator expressed it, "be almost pure velvet".

Mosquito larvae develop in quiet water, swim actively about, brouse actively on algae and other organisms growning on submerged objects, and for most species breathe atmospheric air taken through the surface film.

Blackfly larvae, in strong contrast, develop in running water, are sedentary, usually remaining attached to the surface of rocks and other submerged

objects where the water is flowing swiftly, feed upon floating organisms brought to their highly specialized strainers by the current, and for respiration depend upon dissolved oxygen from the highly aerated water of their rapid-stream habitat.

Control of blackflies directed at the larvae has been complicated by the fact that blackfly breeding streams are likely to be trout streams, and these highly prized game fish must not be harmed.

Earlier experimental work with oil emulsions in concentration sufficient to kill the blackfly larvae, proved harmful to the fish population of the treated streams.

In my own field tests, the pyrethrum-oil larvicides (including by actual test, the N. J. Mosquito Larvicide), however, appear to give an effectual kill of the blackfly larvae without harm to the fish.

In this procedure, advantage is taken of the ecological segregation of the blackfly larvae in the rapids, from the fish in the intervening pools.

The film of pyrethrum larvicide which forms on the quiet surface of the pools in a treated stream, is broken and re-mixed with the water as it passes over a rapid, only to reappear quickly as a film on the surface of the next pool below.

In the agitated water of the rapids, the blackfly larvae are exposed to contact with the pyrethrum-oil insecticide. On the quiet surface of the pools, neither the fish nor the pool inhabiting fish-food insects are so exposed.

Even the brown trout appears experimentally to tolerate without harm exposure to the pyrethrum-oil larvicide in concentrations greater than should ever be encountered in practical control work; and, unlike mosquito control which may require repetition of the necessary treatment at intervals throughout the active season, with only one economically significant brood of blackflies, at least in Northern New York, it appears that effectual control of these insects may be accomplished by a single properly timed application of the larvicide.

## Observations On The Over-Wintering Of Mosquitoes Near Fort DuPont, Delaware

By Carl B. Huffaker
Delaware Agri. Exper. Sta.
Newark, Del.

The literature of the over-wintering of Anopheles quadrimaculatus (and of other American anopheline mosquitoes as well) is very limited. The observations of Hinman (1934) occasioned considerable surprise and discussion regarding the "hibernation" of this species. Such unusual numbers of over-wintering females had not been noted previously. The idea had been prevalent that there is no prolonged period of inactivity, but rather that greatly-reduced, breeding activity occurs intermittantly throughout the winter months.

Since this early work by Hinman, there have been no subsequent accounts of enormous, or even large, numbers of over-wintering females of this mosquito. However, Hinman and Hurlbut (1940) reported other occurrences of small numbers of over-wintering females, and published data on the depletion of the fat body during the dormant season.

Information obtained during the winter of 1941-1942 in the vicinity of Fort DuPont (Delaware City), Delaware, should further the acceptance of the ability of females of this species to undergo a prolonged period of winter cold and inactivity.

In this locality, over-wintering quarters, in one instance, had temperatures as low as 5° and 4°F. Yet, a small number of females successfully passed the winter. Temperatures of favored places, such as cellars, normally were not below 30° to 32°F., and maximal temperatures were generally 38° to 43°F.

During the interval from late November to the middle of March, the rate of mortality was extremely high. It is only because of the excessively large numbers present in this area at the end of the breeding season that appreciable numbers survive the winter.

Females were caged to determine survival. About 2 percent lived until the middle of March, at which time dispersal and resumption of feeding was observed. Data on a total of about 1700 females were recorded. These had been placed in 12 cages, 18" x 18" x 18" in size. Some were fed glucose; others, sucrose; and still others, water only. None took blood, although one group was given that privilege. There seemed to be but little difference in the rates of mortality for these groups.

Observations on uncaged females in cellars, barns, underground dungeons in an old fort (Fort Delaware), culverts, and other places revealed a survival not exceeding 7.3 percent of those present during late November and early December. In the four, most-satisfactory situations, only 2.8, 3.4, 4.1, and 7.3 percent, respectively, survived the winter. As expected, these results where freedom of movement was possible, are somewhat

higher (but nevertheless comparable) to the records of caged material. There probably was some movement into these more favorable situations during the progress of the winter, so that these figures may be higher than the true extent of survival.

As many as 10,000 females were recorded in a single cellar near the end of November, and approximately 6,000 in this and 4,000 in another cellar in middle and late December.

It is obvious, therefore, that huge numbers of A. quadrimaculatus enter "hibernation" quarters and remain there nearly inactive until death, or until warm spring weather arrives. There is, however, no reason to assume that this species is well adapted to large-scale, successful hibernation over a period of four or more months of continued cold. Those that do survive such conditions are few in number.

It is of interest to note that, although Anopheles crucians was very abundant in barns in this area, during early November, not a single specimen was seen after December 19, and very few in early December. In certain barns during early November, this species was nearly as abundant as A. quadrimaculatus. There was, therefore, a very abrupt disappearance of the females of this species. Only one conclusion is possible - that this mosquito does not over-winter in the adult stage in this region. The ability of the eggs of this species to survive winter temperatures both under laboratory-controlled and field conditions will be investigated.

There is a strong possibility, also, that Culex salinarius does not over-winter here in the adult stage. This is the most abundant mosquito in this locality. Yet, all Culex that were certainly identified (several hundred) were C. pipiens, a species that

occurs in much fewer numbers than C. salinarius.

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## Mosquito Virus Causes Death

The Morristown (N.J.) Daily Record of March 24, 1942 carried the following article:

"More than 3,000 cases of human sleeping sickness with upward of 300 deaths in 1941 are reported by the United States Public Health Service. The particular species of mosquito that has just been convicted of transmitting the virus to humans is widespread in states west of the Mississippi. So, just as the southeastern states are battling mosquitoes to curb malaria, the West must fight them to prevent the further spread of sleeping sickness (encephalitis). A few cases have been reported in this area. In the Yakima valley of Washington 27 humans and 50 horses had sleeping sickness last year. Sleeping sickness usually is associated, for some unknown reason, with sporadic cases of infantile paralysis. And sleeping sickness, itself, frequently leaves its marks for life on the minds and bodies of its victims. The only sure way to avoid the disease is to keep from being bitten by mosquitoes.

"Proof that mosquitoes, under natural conditions, transmit the disease, has been provided by University of California scientists. Over 10,000 mosquitoes were frozen and shipped in dry ice from the Yakima Valley to the University's San Francisco laboratories. Sleeping sickness vaccination for humans is not yet practical."

Taken from a:

War Letter For Entomology And Plant Quarantine dated April 21, 1942

From the Bureau of Entomology and Plant Quarantine, U. S. Dept. of Agriculture, Washington, D. C.

ENTOMOLOGISTS IN MILITARY SERVICE: A number of entomologists have received commissions in the Sanitary Corps of the Army and the Hospital Corps Volunteer Service of the Navy. Some of these men were reserve officers in the Army and, upon being called for duty, were assigned to entomological work in the Sanitary Corps. Some entomologists who have been drafted have also been assigned to entomological duties.

The Army and Navy have set up certain requirements for a commission in entomological work: (1) A Bachelor's Degree in entomology; (2) four years of actual experience in the field of medical entomology; (3) an M. S. in medical entomology may be substituted for 1½ years of the above experience; (4) a Doctorate in medical entomology may be substituted for three of the four years of experience; (5) no military experience is required.

Those about to be inducted into the service by draft or through volunteering, who wish to get assignments in the biological field, may request a classification card from the Director of Enrollment, Medical

Technologists, American Red Cross, Washington, D. C. If the qualifications are approved by the Red Cross, the applicants are automatically assigned to the Medical Department and subsequently they may be drawn from replacement centers for duty in fields relating to medicine, including entomology.

## PUBLISHED ARTICLES OF INTEREST

Circular #421 of the N. J. Agricultural Experiment Station, Rutgers University, New Brunswick, N. J., entitled "New Jersey Mechanical Trap for Mosquito Surveys" by Thomas D. Mulhern, is now in circulation. The bulletin contains 8 pages and covers construction, location, method of operation and suggestions for Trap Service. Copies of the above circular may be obtained by writing to the author.

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Science News Letter for April 25, 1942 records on page 265 that sodium pentachlorphenate, now known under the trade name of "Santobrite", has been shown to have the power of killing the water hyacinth. The discoverer is listed as Dr. A. A. Hirsch of the Louisiana State Department of Education. The work was done by means of controlled experiments with plants growing in a series of tubs. Dr. Hirsch found that a solution of as little as 5 parts of the chemical per million of water would sharply retard hyacinth growth while 80 parts per million kills it outright. The weaker concentration is suggested where control rather than elimination is desired without damage to other aquatic life.

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The Experiment Station Record, Volume 86, No. 5, records the fact that H. S. Telford and C. Wester have discovered Anopheles maculipennis and Anopheles punctipennis in eastern North Dakota during the fall of 1941.

The same publication also records the transmission of Plasmodium lophurae by Aedes albopictus. Infection of Culex restuans, Aedes atropalpus and Aedes albopictus were demonstrated. Attempts to infect Aedes aegypti and Culex pipiens failed. Ducks recovered from an infection of Plasmodium lophurae were shown to have immunity to succeeding infections with the same parasite.

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Public Health Reports, Volume 57, No. 13 by the U. S. Public Health Service on March 27, 1942 presented an interesting article "Experimental Malaria Control Drainage Ditch Linings" by Robertson, LePrince, Johnson, and Parker.

In this article, the authors present the advantages and disadvantages of different ditch linings with numerous photographs to emphasize results.

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A new book is being published by Henry Holt & Co., Inc., 257 Fourth Ave., New York City, entitled "Ambassadors in White". It is a story of American tropical medicine by Charles Morrow Wilson.

The book is chiefly concerned with mosquitoes of the tropical Americas and has chapters on the work of Carlos Finlay, Walter Reed, William Gorgas, Bill Deeks, and Noguchi; as well as an account of mosquito work of the temperate zone, including a direct reference to New Jersey work.

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## References To Literature On Mosquitoes And Their Control

By H. H. State, Sr. Entomologist
Bureau of Entomology & Plant Quarantine
Washington, D. C.

The regular appearance of lists of recent contributions to the literature on mosquitoes and their control may assist the readers of "Mosquito News" to keep informed as to contributions to mosquito knowledge, although all may not have access to an extensive entomological library. With this end in view the writer, with the help of the librarians of the Department of Agriculture and others, is compiling, as they become available, such references for the express use of "Mosquito News". No doubt some of the foreign titles to papers will be delayed because of the present emergency, as, for example, the first two of those that follow. Their tardy inclusion, however, may serve to acquaint some reader with their available information, even though they may not be classed as current articles. Literature already reported will not be included.

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## PERSONAL NOTES

Dr. F. C. Bishopp reports that Dr. L. O. Howard, Dean of mosquito workers in the world, is to leave Washington, D. C., early in June for his summer home at the Onteora Club near Tannersville, N. Y. Dr. Howard contemplates remaining in that vicinity for the duration. Those interested in mosquito investigations or control will always be welcome visitors at Dr. Howard's home.

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Lieutenant John W. Scott, formerly of the Union County Mosquito Extermination Commission, is in the 307 Infantry of the 77th Division at Camp Jackson, S.C.

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Edward Butchard, Superintendent of the Nassau County Mosquito Extermination Commission was tendered a luncheon on April 16, 1942 in honor of his twenty-five years' service with that Commission. Mr. Butchard was presented with a gold medal by Mr. Harry Tappen, Supervisor of the Town of Oyster Bay, who also acted as toastmaster for the luncheon.

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The Nassau County Mosquito Extermination Commission now has six of its employees in military service: Captain D. E. Longworth, SnC stationed at Camp Davis, in charge of mosquito control work; Sergeant William Coakley, SnC. engaged in mosquito control work at one of the army camps on the west coast; also four other men in other branches of the service.

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Five members of the Department of Entomology of the niversity of Delaware are now in the Service of Our ountry and are engaged in mosquito and other insect- ontrol activities. At present, Lt. Donald MacCreary is t the Naval Operating Base, Norfolk, Virginia; Lt. W. Fassig is at the Billings General Hospital, Fort enjamin Harrison, Indiana; Lt. R. L. Pierpont is at the ilton General Hospital, Fort Dix, New Jersey; W. A. onnell is with the Medical Detachment, 176th Infantry, acostia, D. C.; and J. H. Beacher is with the 6th edical Training Battalion, Camp Lee, Virginia.

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Mr. Earle D. Potter, Assistant Superintendent of he Middlesex County Mosquito Extermination Commission as been on leave of absence and in the employ of the S. Public Health Service. He was withdrawn from New ersey, where he was serving as Acting Superintendent f the Burlington County Commission, in charge of the P. A. Project about Fort Dix, a unit of the state- ide project. On March 16th he left to go to New Or- eans, and has since been assigned to the County Health epartment at Columbia, S. C. for work about Fort Jack- on. A band 1¼ miles wide about the Fort will be in- luded and it is planned to use four spraying crews, nd 30 laborers on drainage work.

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Mr. Walter D. Henderson, Special Inspector, was ranted a leave of absence on April 1st by the Ocean ounty Mosquito Extermination Commission to take charge f the Fort Dix Project, which has continued under the oint sponsorship of the N. J. State Department of ealth and the State Agricultural Experiment Station, ith the Burlington County Commission as Co-sponsor. r. Henderson is employed by the State Department of ealth. The Project is now averaging about 25 men, all n drainage work.

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Mr. Roy J. Wilson of the U. S. Public Health Service recently assigned to Gloucester County, N. J., was withdrawn in March, and has been assigned to do malarial control work in and around New Orleans, Louisiana. Mr. Wilson was formerly employed with the Morris County Mosquito Extermination Commission, Morris Plains, N. J.

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Russell W. Gies, Sanitary Engineer Reserve, U. S. Public Health Service, was transferred the last week in April from the District Office of the Service in New York City to Atlanta, Georgia. In New York he was in general charge of organizing the program of mosquito control in six New England and four Middle Atlantic states, in defense areas. At Atlanta he will be on the staff of Dr. L. L. Williams, Jr., Medical Officer in charge of the new National Headquarters, Office of Malaria Control in War Areas.

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Herman L. Fellton, recently commissioned as a Passed Ass't. Sanitary Engineer Reserve of the Public Health Service is also working on the staff of Dr. Williams at the National Headquarters in Atlanta.

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Mr. George H. Bradley, U. S. Bureau of Entomology and Plant Quarantine, has been loaned to the National Malaria Control Headquarters to organize the entomological and inspection activities, including trap and all other collections of adult and larvae mosquitoes. Mr. Bradley will have his headquarters at New Smyrna, Florida, for the present and will train entomologists for assignment to each state.

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Mr. John Travis, an inspector for the Essex County Mosquito Extermination Commission, has been engaged by the Civil Health Department of Bermuda to take charge of a mosquito control campaign to be conducted on the Island. The control force will consist of 30 American and 20 British soldiers all working under the Health Department. Mr. Travis began work on May 1st.

New Jersey mosquito traps will be used to measure the mosquito fauna of the Island.

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